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(71) Applicant: ISOWORTH LIMITED [GB/GB]; 1210 Lincoln Road, Werrington, Peterborough PE4 6ND (GB).

(72) Inventors: SCOTT, Alistair ; 32 Mill Lane, Impington, Cambridge CB4 4XN (GB). CLARK, Peter, Frederick ; 7 Orchard Lane, Woodnewton, Peterborough, Cambridgeshire (GB).

(74) Agents: BERESFORD, Keith, Denis, Lewis et al.; Beresford & Co, 2-5 Warwick Court, London WC1R 5DJ (GB).

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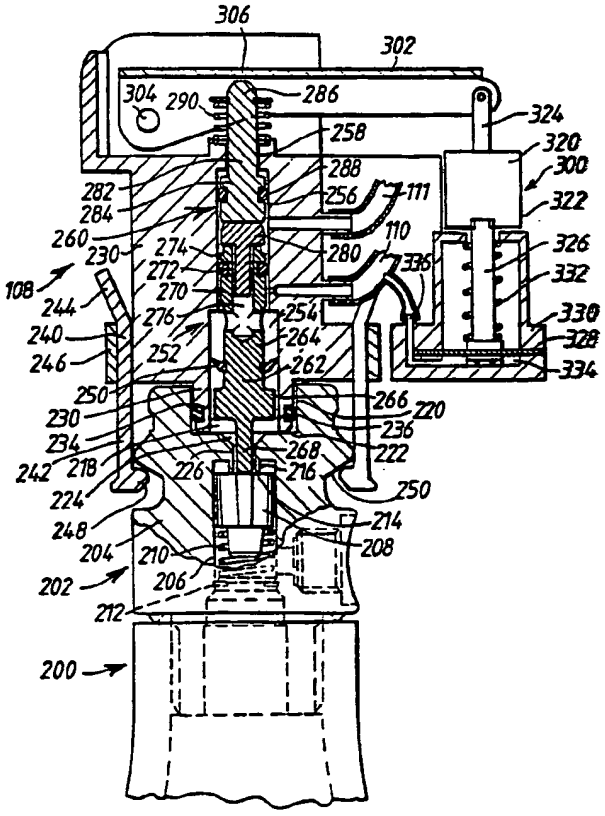
(54) Title: GAS CYLINDER CONNECTOR

(57) Abstract

A connector for connecting a carbon dioxide cylinder (200) to a carbonation apparatus includes a female part having a cylindrical recess (218) for receiving a male part (232) carried by the carbonation apparatus. An axially movable actuator (260) extending through the male part projects through a central passage (226) at the bottom of the cylindrical recess to engage a valve member (208) for opening the valve. The actuator (260) is in three parts (262, 280, 282) and the centre part (280) itself forms a valve which is closed when the actuator is depressed for supplying carbon dioxide from the cylinder (200) to a carbonation chamber but which, when the actuator is released, may open in response to pressure in the carbonation chamber for supplying carbon dioxide therefrom to another part of the apparatus, such as a concentrate supply device.



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GAS CYLINDER CONNECTOR

This invention relates to connectors for pressurised gas and is particulary concerned with such connectors for connecting a vessel containing pressurised carbon dioxide to an apparatus for carbonating water, such as a home carbonation apparatus.

Conventional connectors of this type comprise a first part which is integral with a valve housing provided on the carbon dioxide supply vessel and which includes an axially displaceable valve and a second part which comprises a portion of the carbonation apparatus and includes a gas conduit for receiving gas from the vessel, a sealing member forming a gas seal between the two parts and a plunger which may be actuated to effect movement of the valve. The two parts are conventionally screw-threaded together. Known connectors suffer from the problem that proper operation of the valve is not assured. Further, the sealing surface of the vessel may be damaged in use, for example, by dropping, and as a result a proper seal is not achieved.

These problems are largely solved by the arrangement described in our copending European published Application No. 0 238 312 in which the carbonation apparatus is provided with the male part of the connector which is in the form of a hollow cylindrical member and within which a valve actuator is positioned for axial movement. The gas supply cylinder or vessel has the female part of the connector. Seal means are provided to form a gas seal between the male part and a cylindrical surface of the female part. The gas cylinder or vessel includes a valve which is normally closed but can be moved to the opening position by operation of the valve actuator. A positive stop, acting between the male part of the connector and the female part, accurately positions the valve actuator so that the valve may be reliably operated. A locking device is also provided for locking the male and female parts together.

An aspect of the present invention concerns improvements in the above-described connector.

In one aspect, the invention provides a novel arrangement in which an improved seal is provided by the valve in the vessel.

In another aspect, an improved valve and actuator is provided permitting opening of the valve, even against high pressures within the gas cylinder, by means of a relatively low powered drive mechanism, such as a solenoid.

A further aspect of the invention provides an actuating mechanism for opening a valve in the gas cylinder, which actuating mechanism itself includes a valve arrangement which, in a first condition, connects the carbonation chamber to the gas supply vessel and, in a second condition, connects the carbonation chamber to another part of the apparatus, for example to a concentrate supply device for dispensing concentrate by means of a gas from the carbonation chamber.

The invention is described further by way of example with reference to the accompanying drawings in which:

Figure 1 diagrammatically represents a carbonation apparatus in which the invention is embodied;

Figure 2 shows a portion of the apparatus of Figure 1, including a two-part connector according to a

preferred embodiment of the invention, partly in section, with the parts connected together;

Figure 3 is a perspective view of part of the connector of Figure 2;

Figure 4 illustrates part of the connector shown in Figure 2 on an enlarged scale for the purpose of showing certain of the dimensions; and

Figure 5 illustrates a modification to the apparatus of Figure 2.

With reference to Figure 1, the carbonation apparatus, for home use, is adapted for carbonating relatively small quantities of water such as sufficient to form one or two drinks, and comprises a carbonation chamber 100 to which is connected a water supply means 102 for supplying water to be carbonated, and which has a discharge valve arrangement 104 for discharging carbonated water into a vessel such as a glass 106. A carbon dioxide supply means 108 is connected to the chamber 100 by a conduit 110 for supplying carbon dioxide thereto. A concentrate supply arrangement 112 is connected to the discharge arrangement 104 by one or more conduits 114 for supplying flavouring to the

carbonated water. A conduit 111 connected between the carbon dioxide supply means 108 and the concentrate supply arrangement 112 supplies carbon dioxide to the latter to cause it to supply concentrate, such carbon dioxide being obtained from the carbonation chamber 100 after completion of a carbonation operation as will be more fully understood from the description of Figure 2. The chamber 100 contains a carbonating device which may be of conventional form, such as a nozzle for injecting carbon dioxide into the water, or is preferably as described in our published British Patent Application 2,161,089. The water supply arrangement and concentrate supply arrangement may also be as described in that published British patent application.

With reference to Figures 2 and 3, the carbon dioxide supply means 108 comprises a gas cylinder 200 containing carbon dioxide having a connector 202 secured thereto at the top by conventional means which need not be described. The connector 202 comprises a body 204 having a hollow interior portion 206 in which a solid polypropylene valve element 208 is mounted for vertical axial movement. Preferably, the polypropylene has a Rockwell Hardness in the range

R85-110. A compression spring 210 whose lower end is supported by a ring 212 fixed in the body 204 urges the valve element into engagement with a valve seat 214 so that the valve is normally closed thus preventing the escape of carbon dioxide gas from the cylinder 200. The pressure inside the cylinder 200 may vary widely dependent upon ambient temperature and for example may range from 600 psi to around 2000 pis. To ensure that the valve element 208 may be moved downwardly away from the seat 214, in order to open the valve, by applying a relatively light force thereto under all pressure conditions likely to encountered whilst nevertheless assuring an excellent seal, the valve seat 214 is formed on the lower surface of a downwardly directed cylindrical projection 216 dimensioned carefully to achieve these results. A cylindrical recess 218 is formed at the top of the body 204 and includes smooth cylindrical walls 220, a radially extending bottom surface 222 and a countersink or flustoconical recess 224 in the centre of the bottom surface 222 and communicating through a cylindrical passage 226 with the interior of projection 216.

The carbon dioxide supply means 108 also comprises a body 230 which may be moulded of synthetic plastics material and which is secured to the carbonation apparatus. A cylindrical male member 232 is integrally formed with the body 230 and projects from the bottom thereof for insertion into the female cylindrical recess 218 when the connector parts 108 and 202 are connected together. An external groove 234 in the male member 232 contains an O-ring 236 which forms a gas tight seal with the smooth internal surface 220 of recess 218. The lower end of male member 232 engages the bottom surface 222 of the recess 218 to form a positive stop defining precisely the position of the male member 232 in the recess 218 when the two parts are fully connected together. Further, the provision of the sealing surface 220 inside the female connector minimises the risk of damage to that surface if the carbon dioxide supply vessel should be accidentally dropped.

A split ring 240 (shown in perspective in Fig. 3) is mounted arround the lower portion of housing 230 and is integrally formed with locking fingers 242 and lever portions 244, these parts being a unitary moulding of resilient synthetic plastics material. Outward projections (not shown) on the body 230 retain

the ring 240 against upwards and downwards movement relative to the body 230. The ring 240 is surrounded by a vertically slidable ring 246 which, when slid upwardly engages the lever portions 244 so as to pivot the fingers 242 outwardly to a non-locking position and, when slid downwardly (the position shown in Fig. 2) forces the fingers 242 inwardly so that inward projections 248 at the lower ends thereof engage a downwardly and outwardly facing frustoconical (or inclined) surface 250 provided on the body 204. The interaction between the projections 248 and surface 250 pulls the body 204 upwardly so that the lower end of male member 232 is held firmly against the surface 222 when the two parts are locked together.

A cylindrical passageway 252, which is coaxial with the male member 233, extends vertically through the body and includes a lower portion 254 of large diameter, a mid-portion 256 of intermediate diameter and an upper portion 258 of a small diameter.

A multipart slide 260 is provided in the passage 252 for vertical movement. A lower element 262 of the slide 260 comprises a main body portion 264 located in the large diameter portion 254 of passage 252 and has an outwardly directed flange 266 which is a relatively

loose fit in the portion 254 so that gas may pass the flange 262. A valve actuating rod 268 integrally formed at the lower end of body 264 projects through passage 226 for engagement with the top surface of valve element 208. The element 262 includes an upper extension 270 which is located in the portion 256 of intermediate diameter of passage 252 and carries an O-ring seal 272 in an external groove 274. The O-ring 272 forms a gas tight seal and due to friction with the wall of portion 256 of passage 252, prevents the element 262 from falling out of the body 230 when the connector part 204 is taken away. A passage 276 is formed through the extension 270 and its upper end is closed by a valve 280 which forms a centre element of slide 260. An upper element 282 of slide 260 includes an enlarged portion 284 located in portion 256 of passage 252 and a narrower portion 286 projecting out of the top of the body 230 via narrow portion 258 of passage 252. An O-ring 288 carried by enlarged portion 284 of element 282 forms a gas tight seal with the inside surface of portion 256 of passage 252. A compression spring 290 urges element 282 upwardly.

A solenoid 300 (which will be described in more detail below) is connected to a lever 302 which is pivoted at 304 and arranged, when the solenoid is actuated, to be

drawn downwardly so that an intermediate portion 308 of the lever presses the multipart slide 260 downwardly and the valve actuating rod 268 lifts the valve element 208 from the seat 214, thereby permitting carbon dioxide gas to be supplied to carbonation 100 via passage 226, 252 and conduit 110 which is connected to passage 252 as shown in the drawing. After carbonation has been completed, solenoid 300 is de-energised which permits lever 302 to pivot upwardly. The pressure of the carbon dioxide in chamber 100 is transmitted via conduit 110 into passages 252 and 276 and causes valve element 280 to be raised. Thus the carbon dioxide in the carbonation chamber 100 may be supplied to the concentrate supply device 112 via conduit 111 which is connected to passage 252 at a point above the O-ring 272. Thus, the multipart slides serves the dual function of an actuator for the valve 208 and the valve means for automatically connecting the carbonation chamber to the concentrate supply means following completion of a carbonation operation. Such arrangement is particularly compact and economi to manufacture.

It has already been indicated that the preferred carbonation means is as described in our UK Patent Application No. 2,160,089. Such apparatus utilises a

vaned horizontal rotor which is driven at high speed and achieves carbonation within a few seconds utilising an atmosphere of carbon dioxide gas formed in a space above the water in the carbonation chamber which, accordingly, in operation is only partially filled with water. A means is necessary to control the carbonation pressure in the carbonation chamber so as to terminate the supply of carbon dioxide thereto when the required pressure is reached and to permit additional carbon dioxide to be supplied to the chamber as carbon dioxide gas is used up during the carbonation process. This is achieved in the preferred embodiment of the invention by the arrangement of the solenoid 300. The solenoid comprises a coil 320 indicated diagrammatically in Fig. 2 fixed in a housing 322. A link 324 connects the housing 322 to the arm 302. An armature 326 of the solenoid 300 has its upper end extending into the coil 320 and its lower end fixed to a diaphragm 328 whose periphery is fixed in a housing 330 which is secured to the body of the machine by means not shown. A compression spring 332 acting between the housing 330 and the armature 326 urges the armature downwardly. A pressure chamber 334 provided in the housing 330 below the diaphragm 328 is connected to

the carbonation chamber 100 via conduit 336 and the conduit 110.

When the solenoid 300 is energised, the housing 322 is drawn downwardly, thereby pivoting the lever 302 as previously described, the strength of spring 332 being selected to ensure that at this time the housing moves downwardly rather than the armature being drawn upwardly. When the pressure in the carbonation chamber 100 reaches the required level, the diaphragm 328 is caused to move upwardly against the force of spring 332 so that the armature 326 and housing 322 both move upwardly thereby permitting the entire multipart slide 260 also to move upwardly so that the valve element 208 closes. However, at this time, the upper end of element 286 remains in contact with lever 308 ensuring that the valve element 280 remains closed.

If the pressure in the carbonation chamber drops, the spring 332 pushes the armature 326 downwardly, bringing with it the housing 322 thereby opening the valve 208 again to permit more carbon dioxide to be supplied to the carbonation chamber. This action may be repeated continuously until carbonation has been completed. Thereafter, as previously described,

solenoid 300 is de-energised and valve 280 is opened.

A gasket 250 is provided on body 264 to catch any water which may be drawn into passage 252 from carbonation chamber 100 when the valve 280 is opened. Any such water which does enter passage 252 will largely be returned to chamber 100 when gas is supplied thereto for the next carbonation operation.

Preferably, an electrical control system (not shown) is included, for example as described in our UK Patent Application No. 2,160,089, for performing a carbonation cycle in which, automatically and in response to actuation of a start button, water is introduced into the carbonation chamber to the required level, thereafter the carbonation chamber is pressurised by energising the solenoid 300, the carbonating device is then energised to effect carbonation, and, after completion of carbonation, the solenoid 300 is deenergised and carbon dioxide is supplied from the carbonation chamber to the concentrate supply means.

As already discussed briefly, an important aspect of the present invention concerns the need for ensuring that the valve 208 provides a reliable gas tight seal but is nevertheless openable by a relatively light force. More particularly, one of the objects of the present invention is to provide improvements in this respect relative to the corresponding arrangement shown in our published European Application 0238312. One feature of the invention which particularly contributes to an improved seal is the use of a solid valve element of resilient material such as polypropylene as described, rather than a valve element which comprises a body and a separate sealing element carried thereby as illustrated in the above-mentioned European patent application.

A further particularly important improvement provided by the present invention compared to the arrangement shown in the above-mentioned European application is the arrangement of the valve actuator rod 268 so that, in operation, it projects into the passageway 226 which, during operation acts as a guide holding the actuating rod 268 in general (but not precise) axial alignment with the valve element 208. This makes it possible for the element 262 of slide 260 to be a loose fit in the passage 254 whereby gas may pass

between the element 262 and the walls of the portion 254 without the need for providing gas passageways within the element 262 itself. A consequence of the loose fit, therefore, is that the actuating rod 268 is displaceable radially but as indicated, the arrangement whereby this projects into the passageway 226 ensures that despite the radial freedom resulting from the loose fit of element 262 in passage 254, the correct operational relationship between valve element 208 and actuating rod 268 is maintained. Further, the relatively large countersink 224 provides a guide for the lower end of rod 268 which ensures that the rod 268 is properly guided into the passage 226 when the two parts of the connector are being interconnected. Thus, the size of the countersink 224 should be related to the radial freedom of element 262 within passage portion 254.

Particularly preferred dimensions for the relevant parts of connector part 204 are indicated on Figure 4.

Figures 5 shows a modification in which, an annular upward projection 222a is provided on the surface 222 to act as a positive stop defining the position of male element 230 within female element 218. As will be appreciated from Figure 5, the projection 222a

should be positioned and dimensioned so as to be engaged by the end of element 230. Preferred dimensions are shown on Figure 5.

CLAIMS

1. A carbon dioxide supply vessel for attachment to a male connector part of a carbonation apparatus which is to utilise gas from said vessel, said vessel having at its upper end a female connector part which includes a cylindrical recess for receiving said male connector part, the cylindrical surface of said recess being adapted to form a gas tight seal with the male connector part, a cylindrical passage below said cylindrical recess and in communication with the bottom thereof, said cylindrical passage being substantially coaxial with said cylindrical recess, and a normally closed valve below said cylindrical passage, the arrangement being such that an actuating rod of the carbonation apparatus may enter said cylindrical passage for opening said normally closed valve thereby to permit carbon dioxide from the vessel to enter the apparatus via said cylindrical recess.

2. A vessel according to claim 1, including an inclined guide surface at the bottom of said cylindrical recess and surrounding the end of said cylindrical passage for guiding the actuating rod into the cylindrical passage.

3. A vessel according to claim 1 or 2, including a downwardly and outwardly inclined surface on the outside of said female connector element for engagement by locking fingers for locking the male and female parts together.

4. A vessel according to any preceding claim, wherein said cylindrical recess has a radially extending bottom surface for forming a positive stop to be engaged by the male part.

5. A vessel according to any preceding claim, wherein said cylindrical passage extends into a downward projection the lower edge of which forms a valve seat for said normally closed valve.

6. A vessel according to claim 5, wherein the outside diameter of said valve seat is approximately 3.5 mm.

7. A vessel according to claim 6, wherein the diameter of said cylindrical passage is approximately 2.5 mm.

8. A vessel according to any preceding claim, wherein said normally closed valve comprises a solid valve element of resilient material having an upwardly facing surface directly engageable by the valve actuating rod for opening the valve.

9. Carbonation apparatus comprising a carbonation chamber including means for carbonating water and carbon dioxide supply means connectable to a vessel containing carbon dioxide for supplying carbon dioxide to said carbonation chamber, said carbon dioxide supply means comprising a body, connector means for connecting said body to said carbon dioxide vessel, a passage in said body for receiving carbon dioxide from said vessel when a valve of said vessel is open, an actuating member in said passage and movable axially thereof for opening the valve of the carbonation vessel, first conduit means connecting said passage to said carbonation chamber so that carbon dioxide from the vessel may be supplied to the chamber when the valve of the vessel is opened by said valve actuator, second conduit means connected to said passage, and a valve incorporated in said actuator and arranged to be maintained closed by the application of force to the actuator for opening the valve of the carbon dioxide vessel but to be openable in the

absence of said force to connect the first conduit means to the second conduit means in response to any pressure in the carbonation chamber.

10. Apparatus according to claim 9, wherein said actuator comprises a first part for engaging the valve of the carbon dioxide vessel and a second part through which said force is transmitted to said first part, which is movable relative to said first part and which acts as said incorporated valve.

11. Apparatus according to claim 10, wherein said valve actuator includes a third part through which said force is applied to said second part.

12. Apparatus according to claim 11, wherein said three parts are aligned in said passage.

13. Apparatus according to any preceding claim, including a solenoid for applying said force to said actuator.

14. A Apparatus according to any of claims 1 to 13 including concentrate supply means actuable by supplying gas thereto, said second conduit means being

connected to said concentrate supply means for operating said concentrate supply means.

15. A carbon dioxide supply vessel for use with carbonation apparatus of the type having a cylindrical male connector means with a sealing ring on the outside thereof and valve actuating means located internally of said male connector means and extending therethrough, said vessel comprising a body which is hollow for containing carbon dioxide gas and connection means carried by said body for both mechanically coupling said body to said carbonation apparatus and for supplying carbon dioxide gas from said body to said apparatus, said connection means comprising:

a female connector for receiving said male connector and having a cylindrical inner surface capable of forming a substantially gas tight seal with said sealing member when said male connector is received therein, said cylindrical inner surface having a cross-section of first predetermined size;

a passage coaxial with said cylindrical surface and having a cross-section of second predetermined size substantially less than said first predetermined size,

said passage having a first end opening into said female connector and a second end communicating with the interior of said body for supplying carbon dioxide gas from said body to said female connector;

a valve seat provided at said second end of said passage; and

a valve member engaging said valve seat to form a normally closed valve isolating said female connector from the interior of said body, said valve being adapted to be opened by said valve actuating means of said carbonation apparatus for supplying carbon dioxide from said body to said apparatus via said passage and said female connector.

16. A vessel according to claim 15, wherein said valve member includes a stem located in said passage.

17. A vessel according to claim 15, wherein said passage includes at said one end a portion of increased cross-section relative to said second predetermined cross-section.

18. A vessel according to claim 17, wherein said portion of increased cross-section is conical.

19. The combination of a vessel according to claim 15 and a carbonation apparatus having a cylindrical male connector means adapted to be inserted into said female connector, a sealing ring on the outside of said male connector means adapted for forming a substantially gas tight seal with said cylindrical inner surface of said female connector when said male connector means is inserted into said female connector, positive stop means for limiting axial movement of the male connector means into the female connector to fix the male connector at a predetermined axial position relative to the female connector, locking means engageable with said connection means of said vessel for locking said vessel to said apparatus with said male connector fixed at said predetermined axial position relative to said female connector, and a valve actuator extending through said male connector and axially movable relative thereto for opening said valve.

20. The combination according to claim 19, wherein said valve actuator projects into said passage for opening said valve.

21. The combination according to claim 19, wherein said locking means comprises resilient locking fingers movable generally radially of said connection means, and said connection means includes an inclined surface shaped to draw said vessel towards said connector means upon inward movement of said locking fingers.

FIG. 1

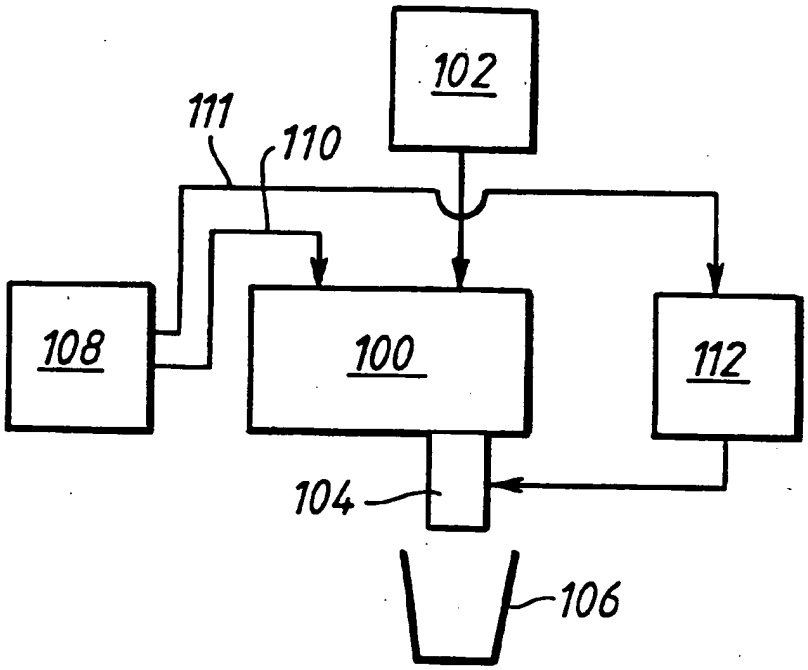

FIG. 2

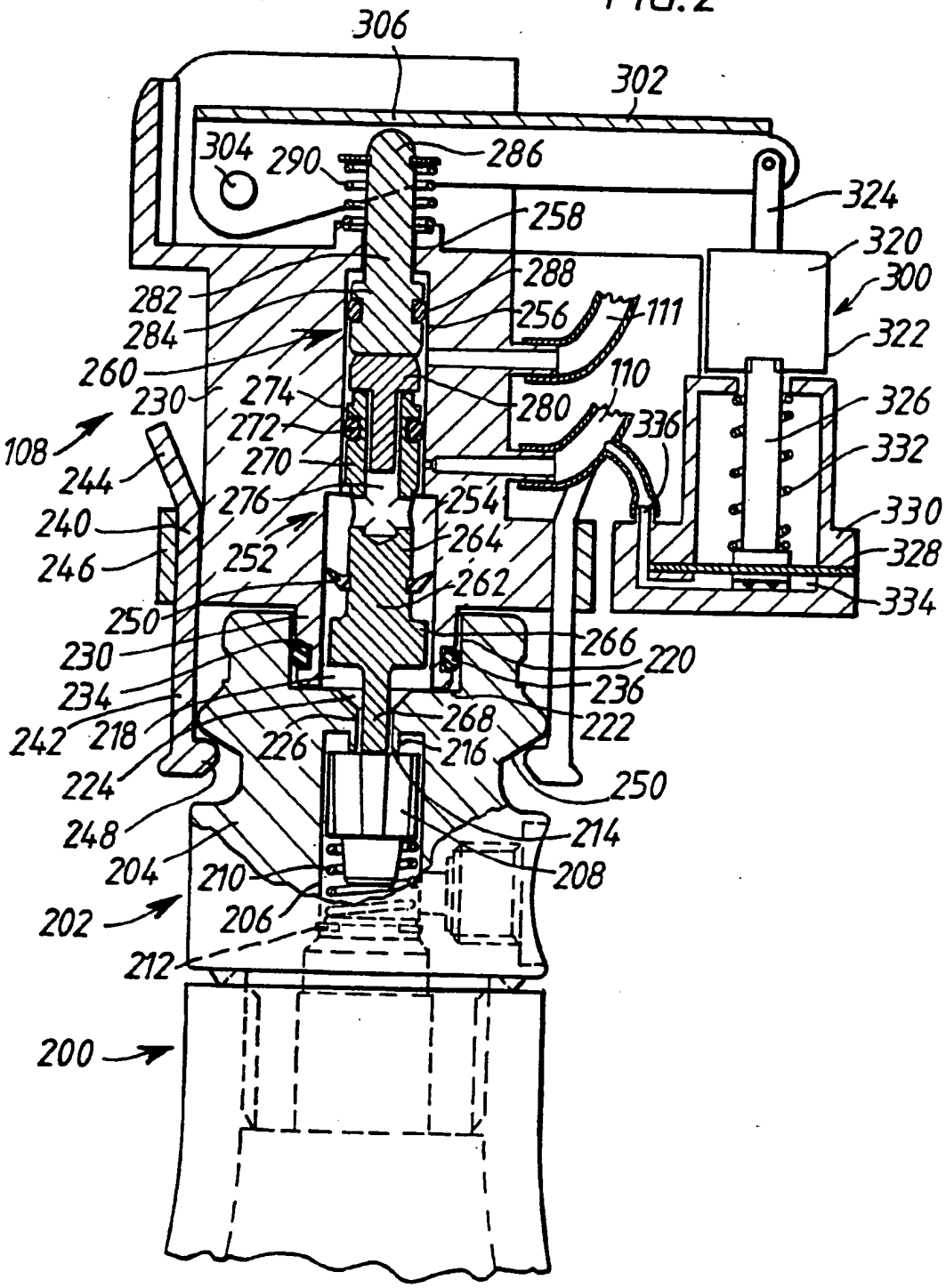
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FIG. 3

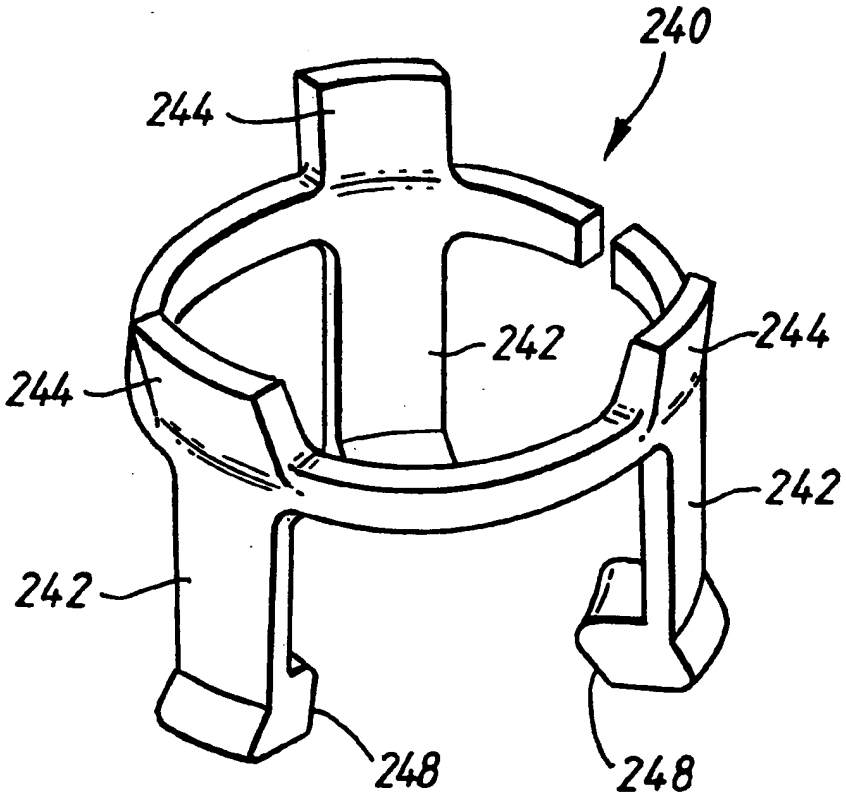

FIG.4

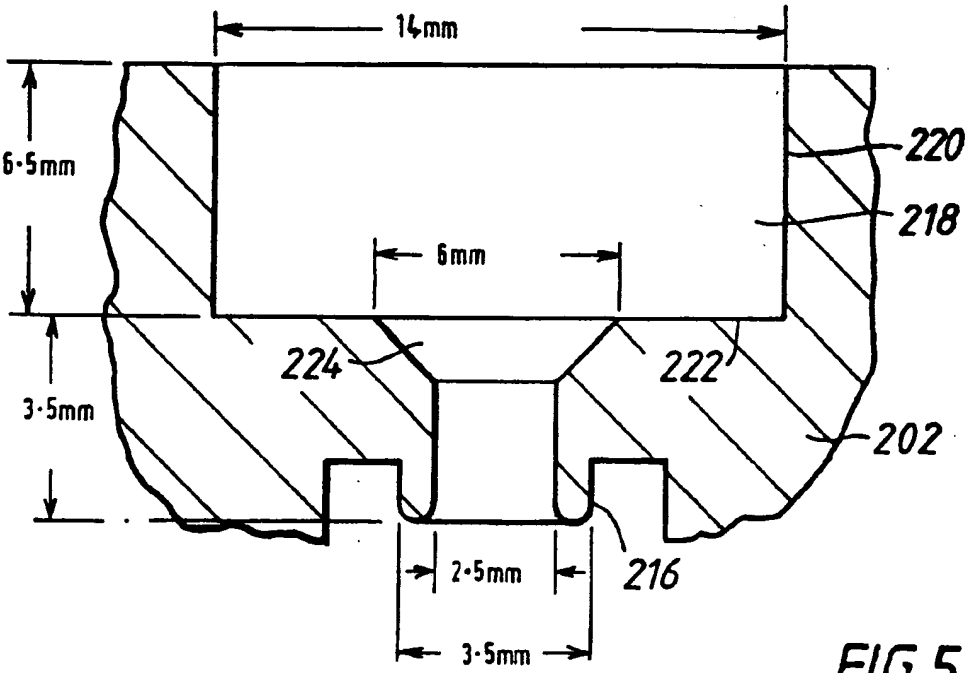
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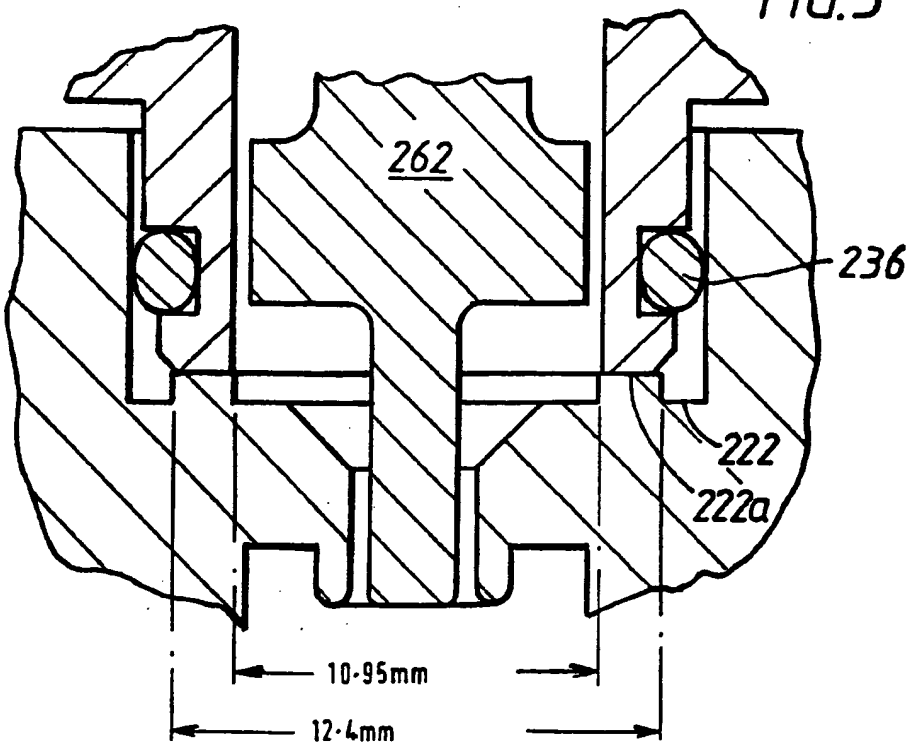
FIG.5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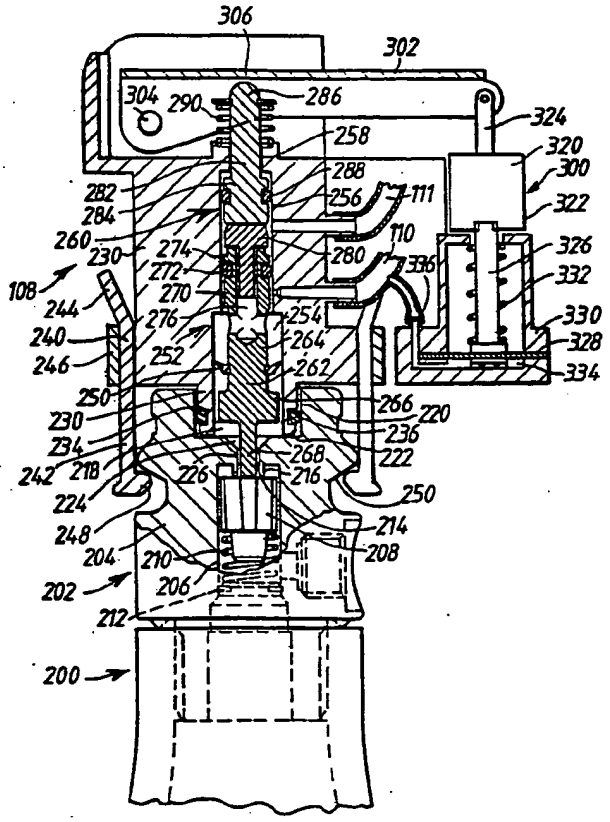

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DK	Denmark	MC	Monaco		

INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 89/00485

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) *

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC^5: B 67 D 1/00, B 67 D 1/08

II. FIELDS SEARCHED

Minimum Documentation Searched 7

Classification System	Classification Symbols
IPC^5	B 67 D

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched *

III. DOCUMENTS CONSIDERED TO BE RELEVANT *

Category *	Citation of Document, 11 with indication, where appropriate, of the relevant passages 12	Relevant to Claim No. 13
X	EP, A, 0238312 (FIZZ-WIZZ OVERSEAS) 23 September 1987, see figures 2-7; column 2, line 24 - column 3, line 10; claims	1-5,8,13, 15-21
Y	(cited in the application)	14
X	GB, A, 2161089 (ISOWORTH LTD) 8 January 1986, see figures 1,22; page 8, lines 31-123	9,13
Y	(cited in the application)	14
A	US, A, 3578219 (BERRY) 11 May 1971, see figures 3,4	1,15
A	EP, A, 0223204 (CADBURY SCHWEPPES) 27 May 1987, see figures 3-3c,7,8; column 5, line 33 - column 6, line 34	1,15
A	GB, A, 8144 AD 1911 (CAMPBELL) 24 August 1911	

* Special categories of cited documents: 10

"A" document defining the general state of the art which is not considered to be of particular relevance

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

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IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
16th January 1990	14. 02. 90
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	L. ROSSI

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

V. ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE [1]

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☐ Claim numbers ....., because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claim numbers....., because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claim numbers....., because they are dependent claims and are not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

VI. ☒ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING [2]

This International Searching Authority found multiple inventions in this international application as follows:

1. Claims : 1 - 8, 13 - 21
2. Claims : 9 - 12

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.

2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

4. ☐ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

☐ The additional search fees were accompanied by applicant's protest.

☒ No protest accompanied the payment of additional search fees.

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. GB 8900485 SA 28581

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 06/02/90
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A- 0238312	23-09-87	GB-A- 2188115	23-09-87
		JP-A- 62227430	06-10-87
GB-A- 2161089	08-01-86	AU-A- 1898788	13-10-88
		AU-B- 579642	01-12-88
		AU-A- 4411085	02-01-86
		DE-A- 3522702	02-01-86
		EP-A- 0166586	02-01-86
		EP-A- 0301169	01-02-89
		GB-A,B 2192560	20-01-88
US-A- 3578219	11-05-71	None	
EP-A- 0223204	27-05-87	US-A- 4712713	15-12-87
		AU-A- 6567286	11-06-87
		AU-A- 6574586	28-05-87
		EP-A- 0223209	27-05-87
		JP-A- 62208393	12-09-87
GB-A- 8144		None	

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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(30) Priority data:
8811605.8 17 May 1988 (17.05.88) GB

(71) Applicant: ISOWORTH LIMITED [GB/GB]; 1210 Lincoln Road, Werrington, Peterborough PE4 6ND (GB).

(72) Inventors: SCOTT, Alistair ; 32 Mill Lane, Impington, Cambridge CB4 4XN (GB). CLARK, Peter, Frederick ; 7 Orchard Lane, Woodnewton, Peterborough, Cambridgeshire (GB).

(74) Agents: BERESFORD, Keith, Denis, Lewis et al.; Beresford & Co, 2-5 Warwick Court, London WC1R 5DJ (GB).

(81) Designated States: AT (European patent), AU, BE (European patent), BR, CH (European patent), DE (European patent), DK, FR (European patent), GB (European patent), IT (European patent), JP, KR, LU (European patent), NL (European patent), NO, SE (European patent).

Published
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(88) Date of publication of the international search report:
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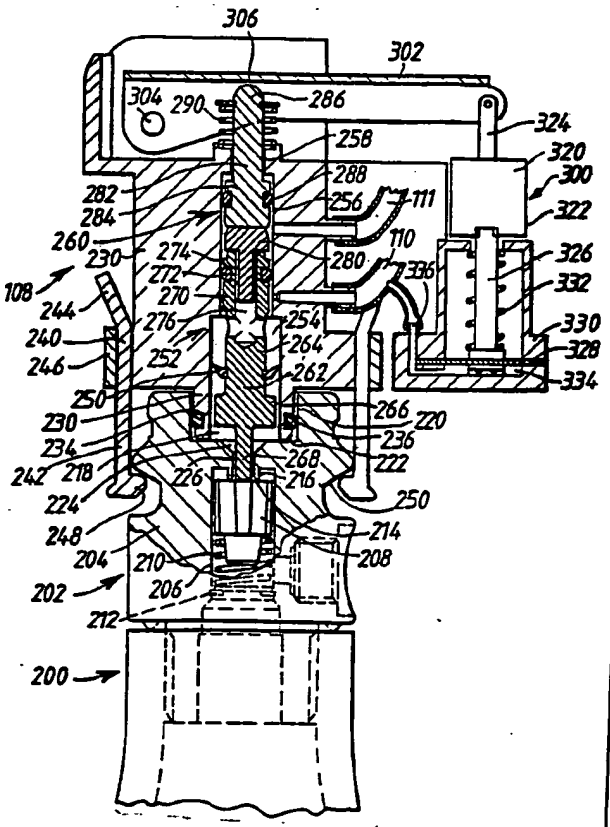
(54) Title: GAS CYLINDER CONNECTOR

(57) Abstract

A connector for connecting a carbon dioxide cylinder (200) to a carbonation apparatus includes a female part having a cylindrical recess (218) for receiving a male part (232) carried by the carbonation apparatus. An axially movable actuator (260) extending through the male part projects through a central passage (226) at the bottom of the cylindrical recess to engage a valve member (208) for opening the valve. The actuator (260) is in three parts (262, 280, 282) and the centre part (280) itself forms a valve which is closed when the actuator is depressed for supplying carbon dioxide from the cylinder (200) to a carbonation chamber but which, when the actuator is released, may open in response to pressure in the carbonation chamber for supplying carbon dioxide therefrom to another part of the apparatus, such as a concentrate supply device.



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\+ Any designation of "SU" has effect in the Russian Federation. It is not yet known whether any such designation has effect in other States of the former Soviet Union.

INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 89/00485

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC[5]: B 67 D 1/00, B 67 D 1/08

II. FIELDS SEARCHED

Classification System	Minimum Documentation Searched [7] Classification Symbols
IPC[5]	B 67 D

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category [10]	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
X	EP, A, 0238312 (FIZZ-WIZZ OVERSEAS) 23 September 1987, see figures 2-7; column 2, line 24 - column 3, line 10; claims	1-5,8,13, 15-21
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		EP-A- 0223209	27-05-87
		JP-A- 62208393	12-09-87
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